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NO DRAWINGS.

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COMPLETE SPECIFICATION.

Improvements in the Production of Packings, Bearings and Fabrics, the Surface of which is Required to have a Low Co-efficient of Friction.

We, SMALL & PARKES LIMITED, a British Company, of Hendham Vale Works, Harpurhey, Manchester, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the production of packings, bearings and fabrics, the surface of which is required to have a low co-efficient of friction, whether built up of laminated materials or formed of solid woven, braided or plaited materials.

It is known that the co-efficient of friction of such articles can be decreased by the incorporation therein of polytetrafluoroethylene in powder or dispersion forms, but with such methods it is difficult to control the disposition of the polytetrafluoroethylene in the material particularly in regard to its disposition on the surface thereof.

It is also known that a fabric woven entirely of yarns or threads of polytetrafluoroethylene can be produced and that such a fabric would have a low co-efficient of friction. Such a fabric does not, however, have other necessary properties for the production of packings and bearings and if employed as the surface layer of a laminated structure cannot be caused to adhere satisfactorily to the adjacent lamination. Moreover, since the whole of the surface is composed of polytetrafluoroethylene the co-efficient of friction cannot be varied to meet any desired requirements.

[*Price* 3*s.* 6*d.*]

We have found that by employing a laminated structure or a solid woven, braided or plaited fabric produced from composite yarns composed of yarns of polytetrafluoroethylene and yarns of asbestor fibres, glass fibres or cellulosic fibres that a very satisfactory material is obtained for the production of packings and bearings, the surface of which is required to have a low co-efficient of friction, and that the ratio between the different fibres on the surface can be controlled to give a desired co-efficient of friction.

The present invention thus consists in a packing, bearing or fabric, the surface of which is required to have a low co-efficient of friction produced from or containing composite yarns composed of yarns of polytetrafluoroethylene and yarns of asbestos fibres, glass fibres or cellulosic fibres.

As an example, such a composite yarn is produced by twisting together two yarns each incorporating an asbestos yarn of 11s count and a thread of polytetrafluoroethylene of 1200 denier producing a yarn having a polytetrafluoroethylene content of about 15%, each ply of the composite yarn being twisted 6z. and doubled with a twist of 5s. A cloth is woven using this composite yarn in both warp and weft with 11 threads per inch warp and 9 threads per inch weft, the cloth having a density of about 46.4 ozs. per square yard.

Such a cloth may be used as the surface layer in a laminated structure or for all the layers in the structure. In either case the laminated structure is formed in the usual

way by impregnation with a phenolic resin solution, dried and moulded under heat and pressure.

In producing a solid woven fabric for the purposes of the invention the aforesaid composite yarns as hereinbefore described can be employed either as weft, warp or binder or as any two or all three thereof. Similarly a braided or plaited fabric can be produced from the composite yarns.

The following advantages result from the invention:—

(a) The amount of polytetrafluoroethylene required can be controlled easily.

(b) Its distribution throughout the material and on the surface thereof can also be controlled.

Furthermore, a packing or bearing formed in accordance with the invention will have improved acid or other chemical resistance properties.

WHAT WE CLAIM IS:—

1. A packing, bearing or fabric, the surface of which is required to have a low co-efficient of friction, produced from or containing composite yarns composed of yarns of polytetrafluoroethylene and yarns of asbestos fibres, glass fibres or cellulosic fibres.

2. A packing, bearing or fabric, the surface of which is required to have a low co-efficient of friction, produced substantially as described in the foregoing Specification.

3. A composite yarn composed of yarns of polytetrafluoroethylene and yarns of asbestos fibres, glass fibres or cellulosic fibres.

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PROVISIONAL SPECIFICATION.

Improvements in the Production of Packings, Bearings and Fabrics, the Surface of which is Required to have a Low Co-efficient of Friction.

We, SMALL & PARKES LIMITED, a British Company, of Hendham Vale Works, Harpurhey, Manchester, do hereby declare this invention to be described in the following statement:—

This invention relates to the production of low friction laminates, packings and bearings.

It is known that the co-efficient of friction of packings and bearings can be decreased by the incorporation therein of polytetrafluoroethylene in powder or dispersion forms, but with such methods it is difficult to control the disposition of the polytetrafluoroethylene in the material particularly in regard to its disposition on the surface thereof.

We have found that by forming composite yarns of asbestos, glass fibres or textile material and yarns or threads of polytetrafluoroethylene and using such composite yarns in the manufacture of laminates, packings or bearings in which a low co-efficient of friction is required, that the disposition of the polytetrafluoroethylene can be controlled within narrow limits as by adjustment of such factors as twist, yarn thickness etc. a composite yarn will be produced in which the polytetrafluoroethylene component will appear on the surface of the yarn in regular fashion and at desired intervals. Further, by incorporating the composite yarn in a woven braided structure the resultant cloth or material presents a controllable amount and location of polytetrafluoroethylene on its surface.

The present invention thus consists of a composite yarn formed of asbestos fibres, glass fibres or textile fibres twisted with a yarn or thread of polytetrafluoroethylene.

As an example, a two-ply non-metallic asbestos yarn was produced with each ply or singles incorporating a core thread of 1200 denier polytetrafluoroethylene yarn giving a total of about 15% polytetrafluoroethylene in the composite yarn, the turns per inch in the production of the composite yarn being 6z singles and 5s doubled. The cloth was produced using this yarn in both warp and weft with 11 threads per inch warp and 9 threads per inch weft, the cloth having a density of about 46.4 ozs. per square yard.

For the purpose of testing this cloth in a conventional woven asbestos/phenolic resin laminate it was impregnated in a phenolic resin solution and dried to remove most of the volatile matter without advancing the state of cure of the resin beyond a stage where subjection to pressure and elevated temperature would cause it to flow. This is the normal procedure in the preparation of an impregnated fabric for laminating. The impregnated dried cloth was stacked in layers and moulded under heat and pressure until the resin was cured and densification complete.

Friction tests on the finished moulding showed a decrease in co-efficient of friction of about 30% upon the level recorded with a laminate identical in all respects except that the polytetrafluoroethylene yarn

was omitted. Wear resistance was unimpaired by the inclusion of the polytetrafluoroethylene.

The cloth incorporating the composite yarn may be used as a surface layer only upon a normal laminated fabric base. The depth to which the polytetrafluoroethylene is required to penetrate the laminate would be determined mainly by the degree of wear which may be expected in service so that a surface containing flecks of polytetrafluoroethylene would always be exposed at the wearing face.

In the case of braided structures instead of employing a composite yarn, one or more yarns of asbestos, glass fibres or textile fibres may be directly braided with a yarn of polytetrafluoroethylene.

The advantages of using polytetrafluoroethylene in yarn form as described over the known methods using it in powder or dispersion form can be summarised as follows:—

(a) The amount of polytetrafluoroethylene introduced can be controlled more easily.

(b) Its disposition throughout the laminate may be controlled in a manner which is not possible using a dispersion.

(c) Mechanical strength of the laminate is assured by providing sufficient resinated asbestos surface at the lamination interfaces. Adhesion is not adversely affected as it would be by a thin overall film of dispersion or powder particles.

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